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- ☐ 1. **Liquid Crystal Microlens Arrays With Switchable Positive and Negative F**
 Fan, Y.-H.; Ren, H.; Liang, X.; Wang, H.; Wu, S.-T.;
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 Volume 1, Issue 1, Sept. 2005 Page(s):151 - 156
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Srinivasan, U.; Helmbrecht, M.A.; Rembe, C.; Muller, R.S.; Howe, R.T.;
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Volume 1, 5-8 Oct. 2003 Page(s):262 - 265 Vol.1
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Fontana, E.;

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1 [Capturing reality I: Dual photography](#)

Pradeep Sen, Billy Chen, Gaurav Garg, Stephen R. Marschner, Mark Horowitz, Marc Le
 Hendrik P. A. Lensch

July 2005 **ACM Transactions on Graphics (TOG)**, Volume 24 Issue 3

Full text available: [pdf\(808.98 KB\)](#) Additional Information: [full citation](#), [abstract](#), [reference terms](#)

We present a novel photographic technique called dual photography, which exploits reciprocity to interchange the lights and cameras in a scene. With a video projector structured illumination, reciprocity permits us to generate pictures from the viewpc projector, even though no camera was present at that location. The technique is cc image-based, requiring no knowledge of scene geometry or surface properties, and nature automatically includes all trans ...

Keywords: dual photography, image synthesis, image-based relighting

2 [Concepts of computer-based modeling for consultation in optics and refraction](#)

C. A. Kulikowski, A. Safir

October 1976 **Proceedings of the annual conference**

Full text available: [pdf\(551.43 KB\)](#) Additional Information: [full citation](#), [abstract](#), [reference terms](#)


In this paper we discuss general principles of computer science applied to problems consultation. We describe some of the design considerations for a computer-based consultation program in optics and refraction. Since the visual system is the input, most of the data entering the central nervous system, the process of refraction serves important purposes beyond the generation of a prescription for a pair of eyeglasses. Refraction, the measurement and correction of optic ...

3 [Image pre-compensation to facilitate computer access for users with refractive](#)

Miguel Alonso, Armando Barreto, J. Gualberto Cremades

September 2003 **ACM SIGACCESS Accessibility and Computing , Proceedings**

SIGACCESS conference on Computers and accessibility, Issue

Full text available:  pdf(718.79 KB) Additional Information: [full citation](#), [abstract](#), [reference terms](#)

The use of computer technology for everyday tasks has become increasingly important today's world. Frequently, computer technology makes use of Graphical User Interfaces (GUIs), presented through monitors or LCD displays. This type of visual interface is suited for users with visual limitations due to refractive errors, particularly when the errors are severe and not correctable by common means. In order to facilitate computer access with refractive deficiencies, an algorithm ...

Keywords: compensation, deblurring, deconvolution, low vision, point, spread function, aberration, wavefront aberration

4 Three-dimensional medical imaging: algorithms and computer systems

M. R. Stytz, G. Frieder, O. Frieder

December 1991 **ACM Computing Surveys (CSUR)**, Volume 23 Issue 4

Full text available:  pdf(7.38 MB) Additional Information: [full citation](#), [references](#), [citations](#), [terms](#), [review](#)

Keywords: Computer graphics, medical imaging, surface rendering, three-dimensional imaging, volume rendering

5 Illumination 1: Chasing the green flash: a global illumination solution for inhomogeneous media

D. Gutierrez, F. J. Seron, O. Anson, A. Muñoz

April 2004 **Proceedings of the 20th spring conference on Computer graphics**

Full text available:  pdf(666.94 KB) Additional Information: [full citation](#), [abstract](#), [reference terms](#)

Several natural phenomena, such as mirages or the green flash, are owed to inhomogeneous media in which the index of refraction is not constant. This makes the light rays take a curved path while going through those media. One way to simulate global illumination in inhomogeneous media is to use a curved ray tracing algorithm, but this approach poses some problems that still need to be solved. This paper introduces a full solution to the global illumination problem, based on what we have ...

Keywords: global illumination, inhomogeneous media, natural phenomena, photorealism, rendering

6 Modeling and rendering waves: wave-tracing using beta-splines and reflective refractive texture mapping

Pauline Y. Ts'o, Brian A. Barsky

July 1987 **ACM Transactions on Graphics (TOG)**, Volume 6 Issue 3

Full text available:  pdf(2.58 MB) Additional Information: [full citation](#), [abstract](#), [reference](#), [index terms](#), [review](#)

The graphical simulation of a certain subset of hydrodynamics phenomena is examined. Algorithms for both modeling and rendering these complex phenomena are presented. Modeling algorithms deal with wave refraction in an ocean. Waves refract in much the same way as light. In both cases, the equation that controls the change in direction is Snell's law. Ocean waves are continuous but can be discretely decomposed into wave rays or wave packets.

7 Wavelength dependent reflectance functions

Jay S. Gondek, Gary W. Meyer, Jonathan G. Newman

July 1994 **Proceedings of the 21st annual conference on Computer graphics and interactive techniques**

Full text available:  pdf(450.35 KB)  ps(3.09 MB) Additional Information: [full citation](#), [abstract](#), [reference](#), [index terms](#)

A wavelength based bidirectional reflectance function is developed for use in realistic synthesis. A geodesic sphere is employed to represent the BRDF, and a novel data structure is used to store this description and to recall it for rendering purposes. A virtual goniospectrophotometer is implemented by using a Monte Carlo ray tracer to cast rays onto a surface. An optics model that incorporates phase is used in the ray tracer to simulate interference effects. An adaptive subdivision ...

Keywords: BRDF, Monte Carlo, full spectral rendering

8 Graphics is fun: Graphics gems revisited: fast and physically-based rendering of gemstones

Stephane Guy, Cyril Soler

August 2004 **ACM Transactions on Graphics (TOG)**, Volume 23 Issue 3

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We present an algorithm for rendering faceted colored gemstones in real time, using modern hardware. Beyond the technical challenge of handling the complex behavior of light on transparent objects, a real time high quality rendering of gemstones has direct applications in the jewelry prototyping, which has now become a standard practice for replacing tedious (and expensive) wax carving methods. Our solution is based on a number of controlled approximations of the physical phenomena in ...

Keywords: Crystal optics, Hardware-based rendering, real time

9 Surface modification tools in a virtual environment interface to a scanning probe microscope

Mark Finch, Vernon L. Chi, Russell M. Taylor, Mike Falvo, Sean Washburn, Richard Su

April 1995 Proceedings of the 1995 symposium on Interactive 3D graphics

Full text available:  pdf(3.87 MB) Additional Information: [full citation](#), [abstract](#), [reference](#), [index terms](#)


The NanoManipulator system has been expanded from a virtual-reality interface for scanning tunneling microscope to include control of atomic force microscopes. The state of the system is reviewed, and new tools extending the user's feel and control manipulation and fabrication in the mesoscopic regime are detailed. Manipulations not be performed using the techniques available from commercial SPM systems are demonstrated, and the direction of ongoing research ...

Keywords: atomic force microscopy, force, haptic, interactive graphics, scanning microscopy, scientific visualization, teleoperation, telepresence, virtual worlds

10 Illumination from curved reflectors

Don Mitchell, Pat Hanrahan

July 1992 **ACM SIGGRAPH Computer Graphics , Proceedings of the 19th annual conference on Computer graphics and interactive techniques**, Volume 15, Number 2


Full text available:  pdf(3.27 MB) Additional Information: [full citation](#), [references](#), [citations](#), [index terms](#)

Keywords: automatic differentiation, caustics, differential geometry, geometrical optics, global illumination, interval arithmetic, ray tracing, wavefronts

11 Adaptive radiosity textures for bidirectional ray tracing

Paul S. Heckbert

September 1990 **ACM SIGGRAPH Computer Graphics , Proceedings of the 17th annual conference on Computer graphics and interactive techniques**, Volume 14, Number 3, Issue 4

Full text available:  pdf(2.90 MB) Additional Information: [full citation](#), [abstract](#), [reference](#), [index terms](#)

We present a rendering method designed to provide accurate, general simulation of illumination for realistic image synthesis. Separating surface interaction into diffuse and specular, we compute the specular component on the fly, as in ray tracing, and store the diffuse component (the radiosity) for later-reuse, similar to a radiosity algorithm. Radiosity values are stored in *adaptive radiosity textures (rexes)*¹ that record the pattern of light on every diffuse surface ...

12 Massively parallel computational methods in light scattering by small particles

David J. Potter, Marshall P. Cline

November 1990 **Proceedings of the 1990 ACM/IEEE conference on Supercomputing**

Full text available:  pdf(728.44 KB) Additional Information: [full citation](#), [abstract](#), [reference](#), [index terms](#)

Algorithms suitable for use on parallel computers are being developed to simulate the scattering and absorption of light by small penetrable objects such as ice crystals and biological cells. The solution of the problem is based on a geometrical optics approach: an incident ray undergoes multiple reflections and refractions as it travels through the object. Since the interactions of each incident ray are independent of those of all other rays, parallel computer architectures can be used.

13 An updated cross-indexed guide to the ray-tracing literature

L. Richard Speer

January 1992 **ACM SIGGRAPH Computer Graphics**, Volume 26 Issue 1

Full text available:  [pdf\(2.94 MB\)](#) Additional Information: [full citation](#), [index terms](#)

14 Unconventional interconnects: Optical solutions for system-level interconnect

Ian O'Connor

February 2004 **Proceedings of the 2004 international workshop on System level interconnect prediction**

Full text available:  [pdf\(873.11 KB\)](#) Additional Information: [full citation](#), [abstract](#), [reference terms](#)

Throughput, power consumption, signal integrity, pin count and routing complexity are increasingly important interconnect issues that the system designer must deal with. Advances in integrated optical devices may deliver alternative interconnect solutions with drastically enhanced performance. This paper begins by outlining some of the more important issues in interconnect design, and goes on to describe system-level optical interconnect applications. Inter- and intra-chip applications. Inter ...

Keywords: interconnect technology, optical interconnect, optical network on chip

15 Rendering I: Vision-realistic rendering: simulation of the scanned foveal image wavefront data of human subjects

Brian A. Barsky

August 2004 **Proceedings of the 1st Symposium on Applied perception in graphical visualization APGV '04**

Full text available:  [pdf\(591.16 KB\)](#) Additional Information: [full citation](#), [abstract](#), [reference terms](#)


We introduce the concept of **vision-realistic rendering** -- the computer generation of synthetic images that incorporate the characteristics of a particular individual's entire visual system. Specifically, this paper develops a method for simulating the scanned foveal image from wavefront data of actual human subjects, and demonstrates those methods on human images. First, a subject's optical system is measured by a Shack-Hartmann wavefront aberrometry device. This device outputs a measure of the wavefront error ...

Keywords: LASIK, Point Spread Function (PSF), blur, human visual system, image processing, ophthalmology, optics, optometry, pupil, ray tracing, vision-realistic rendering

16 Image-based transparency and refraction: Acquisition and rendering of transparent refractive objects

Wojciech Matusik, Hanspeter Pfister, Remo Ziegler, Addy Ngan, Leonard McMillan

July 2002 **Proceedings of the 13th Eurographics workshop on Rendering EGR'**


Full text available:  [pdf\(16.22 MB\)](#) Additional Information: [full citation](#), [abstract](#), [reference index terms](#)

This paper introduces a new image-based approach to capturing and modeling high transparent, or translucent objects. We have built a system for automatically acquiring quality graphical models of objects that are extremely difficult to scan with traditional scanners. The system consists of turntables, a set of cameras and lights, and monoplanes project colored backdrops. We use multi-background matting techniques to acquire environment mattes of the object from multiple views ...

17 Hierarchical view-dependent structures for interactive scene manipulation

Normand Brière, Pierre Poulin

August 1996 **Proceedings of the 23rd annual conference on Computer graphics and interactive techniques**

Full text available:  [pdf\(141.91 KB\)](#) Additional Information: [full citation](#), [references](#), [citing terms](#)

Keywords: color tree, image quadtree, interactive system, ray tree, rendering, scene manipulation

18 Lightfield acquisition & display: Synthetic aperture confocal imaging

Marc Levoy, Billy Chen, Vaibhav Vaish, Mark Horowitz, Ian McDowall, Mark Bolas

August 2004 **ACM Transactions on Graphics (TOG)**, Volume 23 Issue 3

Full text available:  [pdf\(995.29 KB\)](#)  [mov \(25:53 MIN\)](#) Additional Information: [full citation](#), [abstract](#), [reference terms](#)

Confocal microscopy is a family of imaging techniques that employ focused pattern illumination and synchronized imaging to create cross-sectional views of 3D biological specimens. In this paper, we adapt confocal imaging to large-scale scenes by replacing optical apertures used in microscopy with arrays of real or virtual video projectors and cameras. Our prototype implementation uses a video projector, a camera, and an array of mirrors. Using this implementation, we explore confocal imaging of large-scale scenes ...

Keywords: Light fields, camera arrays, coded aperture, confocal microscopy, projected shaped illumination, synthetic aperture

19 Reflection from layered surfaces due to subsurface scattering

Pat Hanrahan, Wolfgang Krueger

September 1993 **Proceedings of the 20th annual conference on Computer graphics and interactive techniques**

interactive techniques

Full text available:  [pdf\(707.86 KB\)](#) Additional Information: [full citation](#), [references](#), [citations](#), [terms](#)

Keywords: Monte Carlo, integral equations, reflection models

20 [Magneto-optical data storage](#)

Terry McDaniel

November 2000 **Communications of the ACM**, Volume 43 Issue 11

Full text available:  [pdf\(397.56 KB\)](#)  [html \(34.62 KB\)](#) Additional Information: [full citation](#), [references](#), [index](#)

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- 1 [Image pre-compensation to facilitate computer access for users with refractive](#)
 Miguel Alonso, Armando Barreto, J. Gualberto Cremades
 September 2003 **ACM SIGACCESS Accessibility and Computing , Proceedings of SIGACCESS conference on Computers and accessibility**, Issue
 Full text available: [pdf\(718.79 KB\)](#) Additional Information: [full citation](#), [abstract](#), [reference terms](#)

The use of computer technology for everyday tasks has become increasingly important today's world. Frequently, computer technology makes use of Graphical User Interfaces (GUIs), presented through monitors or LCD displays. This type of visual interface is suited for users with visual limitations due to refractive errors, particularly when the errors are severe and not correctable by common means. In order to facilitate computer access with refractive deficiencies, an algorithm ...

Keywords: compensation, deblurring, deconvolution, low vision, point, spread function, aberration, wavefront aberration

- 2 [Rendering I: Vision-realistic rendering: simulation of the scanned foveal image wavefront data of human subjects](#)

Brian A. Barsky

August 2004 **Proceedings of the 1st Symposium on Applied perception in graphical visualization APGV '04**

Full text available: [pdf\(591.16 KB\)](#) Additional Information: [full citation](#), [abstract](#), [reference terms](#)


We introduce the concept of **vision-realistic rendering** -- the computer generation of synthetic images that incorporate the characteristics of a particular individual's entire visual system. Specifically, this paper develops a method for simulating the scanned foveal image from wavefront data of actual human subjects, and demonstrates those methods on synthetic images. First, a subject's optical system is measured by a Shack-Hartmann wavefront aberrometry device. This device outputs a measure ...

Keywords: LASIK, Point Spread Function (PSF), blur, human visual system, image ophthalmology, optics, optometry, pupil, ray tracing, vision-realistic rendering

3 Concepts of computer-based modeling for consultation in optics and refraction

C. A. Kulikowski, A. Safir

October 1976 **Proceedings of the annual conference**


Full text available:  pdf(551.43 KB) Additional Information: [full citation](#), [abstract](#), [reference terms](#)

In this paper we discuss general principles of computer science applied to problems of consultation. We describe some of the design considerations for a computer-based consultation program in optics and refraction. Since the visual system is the input to most of the data entering the central nervous system, the process of refraction serves important purposes beyond the generation of a prescription for a pair of eyeglasses. Refraction, the measurement and correction of optic ...

4 Illumination from curved reflectors

Don Mitchell, Pat Hanrahan

July 1992 **ACM SIGGRAPH Computer Graphics , Proceedings of the 19th annual conference on Computer graphics and interactive techniques**, Volume 1

Full text available:  pdf(3.27 MB) Additional Information: [full citation](#), [references](#), [citations terms](#)

Keywords: automatic differentiation, caustics, differential geometry, geometrical optics, global illumination, interval arithmetic, ray tracing, wavefronts

5 Wavelength dependent reflectance functions

Jay S. Gondek, Gary W. Meyer, Jonathan G. Newman

July 1994 **Proceedings of the 21st annual conference on Computer graphics and interactive techniques**


Full text available:  pdf(450.35 KB)  ps(3.09 MB) Additional Information: [full citation](#), [abstract](#), [reference index terms](#)

A wavelength based bidirectional reflectance function is developed for use in realistic synthesis. A geodesic sphere is employed to represent the BRDF, and a novel data structure is used to store this description and to recall it for rendering purposes. A virtual goniospectrophotometer is implemented by using a Monte Carlo ray tracer to cast rays on a surface. An optics model that incorporates phase is used in the ray tracer to simulate interference effects. An adaptive subdivision ...

Keywords: BRDF, Monte Carlo, full spectral rendering

6 Low cost illumination computation using an approximation of light wavefronts


Gershon Elber

July 1994 **Proceedings of the 21st annual conference on Computer graphics and interactive techniques**Full text available:  [pdf\(1.11 MB\)](#) Additional Information: [full citation](#), [abstract](#), [reference terms](#)
 [ps\(2.47 MB\)](#)


We present an efficient method to simulate the propagation of wavefronts and apply the behavior of light in an environment of freeform surfaces. The proposed method emulates the behavior of a wavefront emanating from a point or spherical light source, possibly refracted and/or reflected from a freeform surface. Moreover, it allows one to render images with extreme illumination conditions such as caustics. The proposed method can be embedded into render ...

Keywords: caustics, freeform surfaces, illumination, spot light source, wavefronts**7** Tracing ray differentials

Homan Igehy

July 1999 **Proceedings of the 26th annual conference on Computer graphics and interactive techniques**Full text available:  [pdf\(1.05 MB\)](#) Additional Information: [full citation](#), [references](#), [citations terms](#)**8** Perception: A photon accurate model of the human eye

Michael F. Deering

July 2005 **ACM Transactions on Graphics (TOG)**, Volume 24 Issue 3Full text available:  [pdf\(1.09 MB\)](#) Additional Information: [full citation](#), [abstract](#), [reference terms](#)

A photon accurate model of individual cones in the human eye perceiving images on display devices is presented. Playback of streams of pixel video data is modeled as photon emission events from within the physical substructure of each display pixel. generated electromagnetic wavefronts are refracted through a four surface model of the human cornea and lens, and diffracted at the pupil. The position, size, shape, and color of each of the five million photoreceptors ...

Keywords: display devices, eye models, human eye cone models, schematic eyes, synthesized retina**9** 3D graphics and the wave theory

Hans P. Moravec

August 1981 **ACM SIGGRAPH Computer Graphics , Proceedings of the 8th annual conference on Computer graphics and interactive techniques**, Volume 15 Issue 3Full text available:  [pdf\(894.03 KB\)](#) Additional Information: [full citation](#), [abstract](#), [reference terms](#)

[KB\)](#)[index terms](#)

A continuing trend in computer representation of three dimensional synthetic scene ever more accurate modelling of complex illumination effects. Such effects provide necessary for a convincing illusion of reality. The best current methods simulate multiple specular reflections and refractions, but handle at most one scattering bounce per pixel. They cannot accurately simulate diffuse light sources, nor indirect lighting via scattering media, without prohibitive increases in ...

10 Hierarchical view-dependent structures for interactive scene manipulation

Normand Brière, Pierre Poulin

August 1996 **Proceedings of the 23rd annual conference on Computer graphics and interactive techniques**

Full text available: [pdf\(141.91 KB\)](#) Additional Information: [full citation](#), [references](#), [citations](#), [terms](#)

Keywords: color tree, image quadtree, interactive system, ray tree, rendering, scene

11 Capturing reality I: Dual photography

Pradeep Sen, Billy Chen, Gaurav Garg, Stephen R. Marschner, Mark Horowitz, Marc Leventhal, Hendrik P. A. Lensch

July 2005 **ACM Transactions on Graphics (TOG)**, Volume 24 Issue 3

Full text available: [pdf\(808.98 KB\)](#) Additional Information: [full citation](#), [abstract](#), [reference](#), [terms](#)

We present a novel photographic technique called dual photography, which exploits reciprocity to interchange the lights and cameras in a scene. With a video projector and structured illumination, reciprocity permits us to generate pictures from the viewpoint of the projector, even though no camera was present at that location. The technique is completely image-based, requiring no knowledge of scene geometry or surface properties, and its nature automatically includes all transparent objects ...

Keywords: dual photography, image synthesis, image-based relighting

12 Parallel rendering: Interactive headlight simulation: a case study of interactive ray tracing

Carsten Benthin, Tim Dahmen, Ingo Wald, Philipp Slusallek

September 2002 **Proceedings of the Fourth Eurographics Workshop on Parallel and Visualization EGPGV '02**

Full text available: [pdf\(1.27 MB\)](#) Additional Information: [full citation](#), [abstract](#), [reference](#)

Today's rasterization graphics hardware provides impressive speed and features making it a standard tool for interactively visualising virtual prototypes early in the industrial design process. However, due to inherent limitations of the rasterization approach many optical effects can only be approximated. For many products, in particular in the car industry,

resulting visual quality and realism is inadequate as the basis for critical design decisions. The original goal of using virtual ...

13 Acquiring the reflectance field of a human face

Paul Debevec, Tim Hawkins, Chris Tchou, Haarm-Pieter Duiker, Westley Sarokin, Mark
July 2000 **Proceedings of the 27th annual conference on Computer graphics and interactive techniques**

Full text available:  pdf(3.70 MB) Additional Information: [full citation](#), [abstract](#), [reference](#), [index terms](#)


We present a method to acquire the reflectance field of a human face and use these measurements to render the face under arbitrary changes in lighting and viewpoint. We acquire images of the face from a small set of viewpoints under a dense sampling of illumination directions using a light stage. We then construct a reflectance function for each observed image pixel from its values over the space of illumination directions. From these reflectance functions, we can directly ...

Keywords: facial animation, image-based modeling, rendering and lighting

14 Reconstructing occlusal surfaces of teeth using a genetic algorithm with simulated annealing type selection

Vladimir Savchenko, Lothar Schmitt

May 2001 **Proceedings of the sixth ACM symposium on Solid modeling and applications**

Full text available:  pdf(708.02 KB) Additional Information: [full citation](#), [abstract](#), [reference](#), [index terms](#)

In this paper, we present an application of numerical optimization for surface reconstruction (more precisely: reconstruction of missing parts of a real geometric object represented by volume data) by employing a specially designed genetic algorithm to solve a problem concerning computer-aided design in dentistry. Using a space mapping technique, the surface of a given model tooth is fitted by a shape transformation to extrapolate (or reconstruct) the remaining surface of a patient's tooth with ...

Keywords: computer-aided restoration design, constructive solid geometry, genetic algorithm, simulated annealing, space mapping, surface reconstruction, volume modeling

15 Time dilation visualization in relativity

Ping-Kang Hsiung, Robert H. Thibadeau, Christopher B. Cox, Robert H. P. Dunn

November 1990 **Proceedings of the 1990 ACM/IEEE conference on Supercomputing**

Full text available:  pdf(2.20 MB) Additional Information: [full citation](#), [abstract](#), [reference](#)


This work extends our previous effort in visualizing the spatial aspect of relativistic time dilation; it treats the phenomenon of time dilation; an inherent temporal effect of special relativity. We demonstrate through still-frame images and live animations that in *observing* time independent time dilation, the finite light transit time involved in performing the observation makes the *observed* time dilation also depend on the viewing condition. As we introduce the physics of ...

16 Supervised adaptive resonance networks

R. S. Baxter

May 1991 **Proceedings of the conference on Analysis of neural network appli**Full text available:  pdf(1.44 MB) Additional Information: [full citation](#), [references](#), [index](#)**17 Three-dimensional medical imaging: algorithms and computer systems**

M. R. Stytz, G. Frieder, O. Frieder

December 1991 **ACM Computing Surveys (CSUR)**, Volume 23 Issue 4Full text available:  pdf(7.38 MB) Additional Information: [full citation](#), [references](#), [citing terms](#), [review](#)**Keywords:** Computer graphics, medical imaging, surface rendering, three-dimens
imaging, volume rendering**18 A CAD tool for optical MEMS**Timothy P. Kurzweg, Steven P. Levitan, Philippe J. Marchand, Jose A. Martinez, Kurt F.
Donald M. ChiarulliJune 1999 **Proceedings of the 36th ACM/IEEE conference on Design automat**Full text available:  pdf(148.76
KB) Additional Information: [full citation](#), [references](#), [index](#)**Keywords:** MEMS-CAD, MOEMS, micro-optics, optical MEMS**19 Illumination 1: Chasing the green flash: a global illumination solution for inhom
media**

D. Gutierrez, F. J. Seron, O. Anson, A. Muñoz


April 2004 **Proceedings of the 20th spring conference on Computer graphics**Full text available:  pdf(666.94
KB) Additional Information: [full citation](#), [abstract](#), [reference](#)

Several natural phenomena, such as mirages or the green flash, are owed to inhom
media in which the index of refraction is not constant. This makes the light rays tra
curved path while going through those media. One way to simulate global illuminat
inhomogeneous media is to use a curved ray tracing algorithm, but this approach p
some problems that still need to be solved. This paper introduces a full solution to
illumination problem, based on what we have ...

Keywords: global illumination, inhomogeneous media, natural phenomena, photor
realism, rendering

20 Modeling and rendering waves: wave-tracing using beta-splines and reflective refractive texture mapping.

Pauline Y. Ts'o, Brian A. Barsky

July 1987 **ACM Transactions on Graphics (TOG)**, Volume 6 Issue 3Full text available:  pdf(2.58 MB) Additional Information: [full citation](#), [abstract](#), [reference index terms](#), [review](#)

The graphical simulation of a certain subset of hydrodynamics phenomena is examined. Algorithms for both modeling and rendering these complex phenomena are presented. Modeling algorithms deal with wave refraction in an ocean. Waves refract in much the same way as light. In both cases, the equation that controls the change in direction is Snell's law. Ocean waves are continuous but can be discretely decomposed into wave rays or wavefronts.

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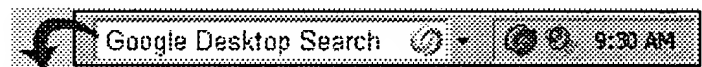
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IEEE JNL IEEE Journal or Magazine

IEEE CNF IEEE Conference Proceeding

IEEE CNF IEEE Conference Proceeding

IEEE STD IEEE Standard

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Kimura, I.; Kawai, M.;
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Anderson, W.; Beyers, N.; Fannin, B.;
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Misme, P.;
Antennas and Propagation, IEEE Transactions on [legacy, pre - 1988]
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Anderson, W.; Beyers, N.; Rainey, R.;
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Hartog, A.; Adams, M.; Sladen, F.; Payne, D.; Ankiewicz, A.;
Quantum Electronics, IEEE Journal of
Volume 18, Issue 5, May 1982 Page(s):825 - 838
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- ☐ **8. Definition of anisotropic aberrations in planar lenses**
Jiang, W.; Ristic, V.;
Quantum Electronics, IEEE Journal of
Volume 22, Issue 10, Oct 1986 Page(s):1934 - 1935
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Berger, M.; Trout, T.; Levit, N.;
Computer Graphics and Applications, IEEE
Volume 10, Issue 3, May 1990 Page(s):36 - 41
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When air is replaced by oil of the same **refractive index** as glass, ... This problem
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Assume that all **rays** entering the **microscope** make small angles with the normal
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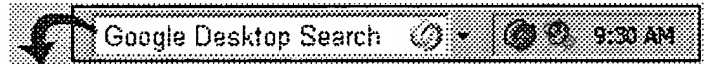
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